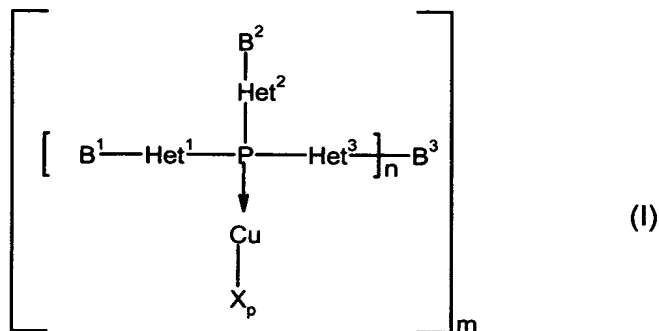


WHAT IS CLAIMED IS:

1. Compounds of the formula (I)



5 in which

Het¹, Het² and Het³ are each independently absent, or are oxygen or NR¹ where R¹ is C₁-C₈-alkyl, C₅-C₁₈-aryl or C₆-C₁₉-arylalkyl and

10

B¹ and B² are each independently C₁-C₈-alkyl, C₅-C₁₈-aryl or C₆-C₁₉-arylalkyl, or the B¹ and B² radicals together are a divalent radical having a total of 2 to 40 carbon atoms and

15

B³ is C₁-C₈-alkyl, C₅-C₁₈-aryl, C₆-C₁₉-arylalkyl or a radical having a total of 2 to 40 carbon atoms and the valency n,

20

X is halide, (C₁-C₈-haloalkyl)carboxylate, (C₁-C₈-alkyl)carboxylate, (C₁-C₈-haloalkyl)sulphonate, (C₅-C₁₈-aryl)sulphonate, cyanide, optionally fluorinated acetyl-acetate, nitrate, oxinate, phosphate, carbonate, hexafluorophosphate, tetraphenylborate, tetrakis-(pentafluorophenyl)borate or tetrafluoroborate, and

p is 0, 1 or 2 and

n is 1, 2 or 3 and

5 m is 1, 2, 3, 4, 5 or 6.

2. Compounds according to Claim 1, characterized in that Het¹, Het² and Het³ are each independently oxygen or are absent.
- 10 3. Compounds according to Claim 1, characterized in that B¹ and B² are each independently secondary C₃-C₈-alkyl or tertiary C₄-C₈-alkyl, C₅-C₁₈-aryl or bis(C₅-C₁₈-aryl), or B¹ and B² together are a divalent radical which is selected from the group of 1,2-phenylene, 1,3-phenylene, 1,2-cyclohexyl, 1,1'-ferrocenyl, 1,2-ferrocenyl, 2,2'-
15 (1,1'-binaphthyl) and 1,1'-biphenyl, and the radicals mentioned which are optionally mono- or polysubstituted by cyano, chlorine, fluorine, C₁-C₁₂-alkyl, C₁-C₁₂-haloalkyl, C₁-C₁₂-alkoxy, C₁-C₁₂-haloalkoxy, di(C₁-C₈-alkyl)amino or tri(C₁-C₈-alkyl)siloxy.
- 20 4. Compounds according to Claim 1, characterized in that B³ is secondary C₃-C₈-alkyl, tertiary C₄-C₈-alkyl, C₅-C₁₈-aryl, C₆-C₁₉-arylalkyl or a radical having a total of from 2 to 40 carbon atoms and the valency n.
- 25 5. Compounds according to Claim 1, characterized in that x is chloride, bromide, iodide, trifluoromethanesulphonate, trifluoroacetate, methanesulphonate, benzenesulphonate, cyanide, optionally fluorinated acetylacetonate, hexafluorophosphate or
30 tetrafluoroborate.

6. Compounds according to Claim 1, characterized in that n is 1 or 2 and m is 1 or 2.

7. Compounds according to Claim 1, characterized in that they contain the following phosphorus compounds as ligands selected from the group consisting of: bis(2-dicyclohexylphosphino)-2'-(N,N-dimethylamino)biphenyl, 2-(dicyclohexylphosphino)biphenyl, 2-(dicyclohexylphosphino)-2'-methylbiphenyl, 2-(di-tert-butylphosphino)biphenyl, 2-(bis(diphenylphosphino)binaphthyl, 2-(di-tert-butylphosphino)biphenyl, 2-(dicyclohexylphosphino)biphenyl, 1,1'-biphenyl-2-yl dicyclohexyl phosphonite, 1,1'-biphenyl-2-yl di-tert-butyl phosphonite, 3-[(diisopropylphosphino)oxy]phenyl diisopropyl phosphonite, 3-[(di-tert-butylphosphino)oxy]phenyl di-tert-butyl phosphonite, 3-[(diphenylphosphino)oxy]phenyl diphenyl phosphonite, 3-[(dicyclohexylphosphino)oxy]phenyl dicyclohexyl phosphonite, 1,1'-binaphthyl-2,2'-diyl isopropyl phosphite and 2,4,8,10-tetra-tert-butyl-6-phenoxy-12H-di-benzo[d,g][1,3,2]dioxaphosphocine.

8. The compounds of formula (I) as recited in Claim 1 comprising $[(\mu\text{-Br})_2\{2\text{-(di-tert-butylphosphino)biphenyl}\}_2\text{Cu}_2]$, $[(\mu\text{-Br})_2\{2\text{-(di-tert-butylphosphino)biphenyl}\}_2\text{Cu}_2]$, $[(\mu\text{-trifluoromethanesulphonato})_2\{2\text{-(di-tert-butylphosphino)biphenyl}\}_2\text{Cu}_2]$, $[(\mu\text{-Br})_2\{2\text{-(dicyclohexylphosphino)biphenyl}\}_2\text{Cu}_2]$, $[(\mu\text{-trifluoromethanesulphonato})_2\{2\text{-(dicyclohexylphosphino)biphenyl}\}_2\text{Cu}_2]$ and $[(\mu\text{-Br})_2\{1,1'\text{-binaphthyl-2,2'-diyl isopropyl phosphite}\}_2\text{Cu}_2]$.

9. A process for forming carbon-nitrogen, carbon-oxygen and carbon-sulphur bonds, and also for preparing arylalkynes comprising

catalyzing the formation or preparation with compounds according to Claim 1.

10. Catalysts comprising compounds according to Claim 1.

5

11. Process for preparing compounds of the formula (IV)



in which

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n is 1, 2 or 3 and

Ar is a substituted or unsubstituted aromatic radical and

15

F is oxygen, sulphur, NR^3 , NR^3CO or ethyndiyl, where R^3 is hydrogen, $\text{C}_1\text{-C}_{12}$ -alkyl, $\text{C}_5\text{-C}_{18}$ -aryl or $\text{C}_6\text{-C}_{19}$ -arylalkyl and

R^2 is Ar, $\text{C}_1\text{-C}_{12}$ -alkyl, $\text{C}_1\text{-C}_{12}$ -haloalkyl, $\text{C}_2\text{-C}_{12}$ -alkenyl or $\text{C}_6\text{-C}_{19}$ -arylalkyl,

20

comprising reacting compounds of the formula (V)



25

in which

Ar is as defined above and

Z is chlorine, bromine, iodine, a diazonium salt or sulphonate

30

with compounds of the formula (VI)



5 in which

F and R² are each as defined above and

in the presence of base and compounds according to Claim 1.

10

12. Process according to Claim 11, characterized in that the compounds according to Claim 1 are used as isolated compounds or generated in situ.

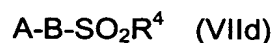
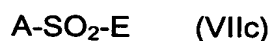
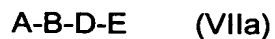
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13. Process according to Claim 11, characterized in that Ar is carbocyclic aromatic radicals having 6 to 24 framework carbon atoms or heteroaromatic radicals having 5 to 24 framework atoms of which no, one, two or three framework atoms per cycle, but at least one framework atom in the entire molecule, are heteroatoms which are selected from the group of nitrogen, sulphur and oxygen, and the carbocyclic aromatic radicals or the heteroaromatic radicals which are optionally substituted by up to five identical or different substituents per cycle which are selected from the group of hydroxyl, chlorine, fluorine, nitro, cyano, free or protected formyl, C₁-C₁₂-alkyl, C₅-C₁₄-aryl, C₆-C₁₅-arylalkyl, -PO-[(C₁-C₈)-alkyl]₂, -PO-[(C₅-C₁₄)-aryl]₂, -PO-[(C₁-C₈)-alkyl](C₅-C₁₄aryl)], tri(C₁-C₈-alkyl)siloxy or radicals of the formula (VIIa-f)

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A-SO₃W (VIIe)

A-COW (VIIIf)

in which, each independently,

5 A is absent or is a C₁-C₈-alkylene radical and

B is absent or is oxygen, sulphur or NR⁴,

10 where R⁴ is hydrogen, C₁-C₈-alkyl, C₆-C₁₅-arylalkyl or C₅-C₁₄-aryl and

D is a carbonyl group and

15 E is R⁵, OR⁵, NHR⁶ or N(R⁶)₂,

 where R⁵ is C₁-C₈-alkyl, C₆-C₁₅-arylalkyl, C₁-C₈-haloalkyl or C₅-C₁₄-aryl and

20 R⁶ is in each case independently C₁-C₈-alkyl, C₆-C₁₅-arylalkyl or C₅-C₁₄-aryl, or N(R⁶)₂ together is a cyclic amino radical and

25 W is OH, NH₂ or OM where M is an alkali metal ion, half an equivalent of an alkaline earth metal ion, an ammonium ion or an organic ammonium ion.

14. Process according to Claim 11, characterized in that R² is Ar or C₁-C₁₂-alkyl.

15. Process according to Claim 11, characterized in that the compounds of the formula (I) are used in amounts of 0.02 mol% to 10 mol%, based on the compounds of the formula (IV) used.
- 5 16. Process according to Claim 11, characterized in that the base used is an alkali metal and/or alkaline earth metal carbonate, hydrogen-carbonate, alkoxide, phosphate, fluoride and/or hydroxide.
- 10 17. Process according to Claim 11, characterized in that the bases used are pretreated by grinding and/or drying.